PREVALENCE OF GASTROINTESTINAL SYMPTOMS AMONG RESIDENTS OF THE CAÑO MARTIN PEÑA COMMUNITIES, SAN JUAN, PUERTO RICO
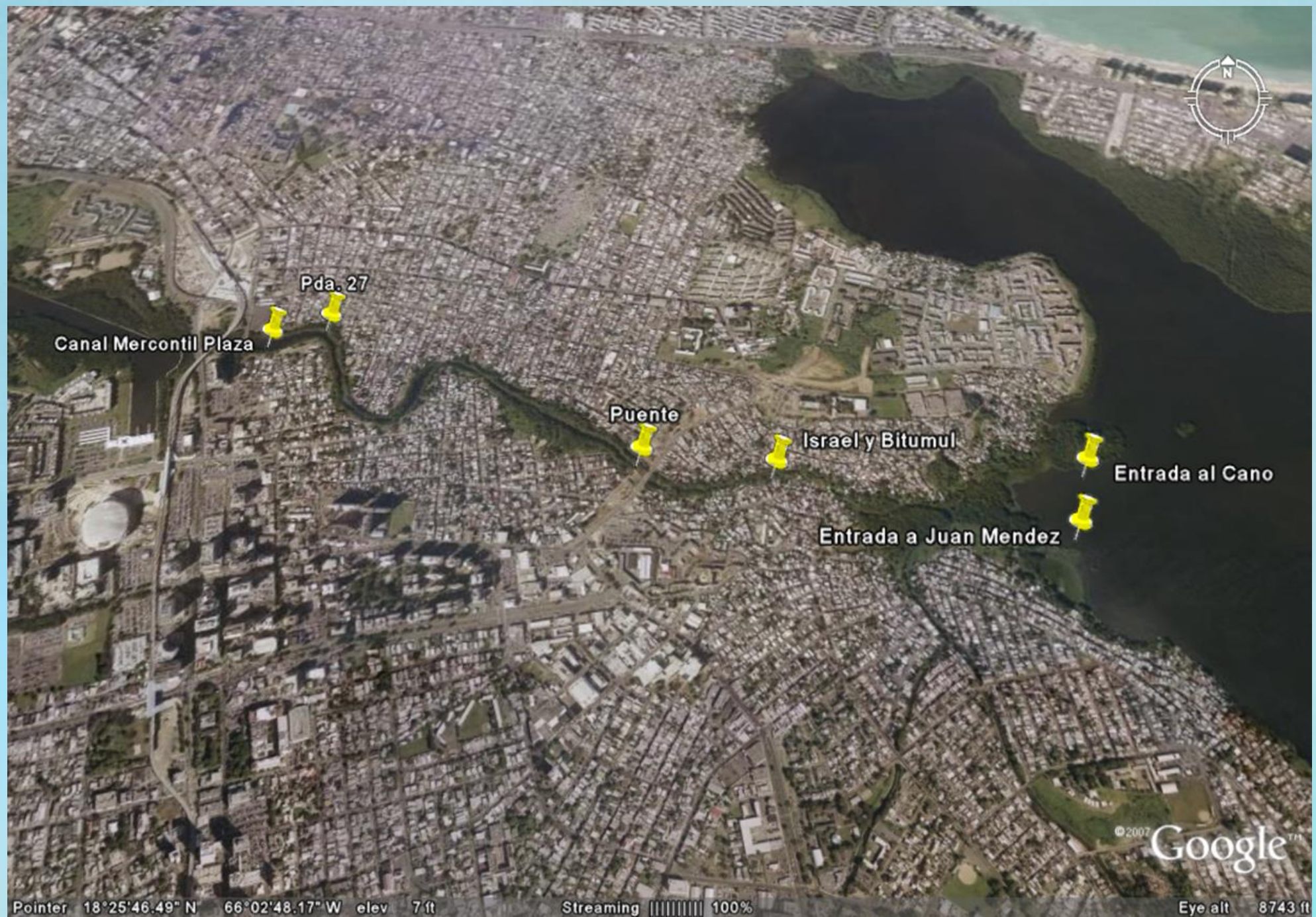
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Caño Martín Peña Background

Foto aérea año 1936

Foto aérea año 1981

Foto aérea año 1962

Foto aérea año 2002

Environmental Health Problems at CMP

Solid waste dumping at CMP water channel → Extreme sedimentation → Water channel hydraulic flow reduction → Water channel incapacity to assimilate flood events → CMP neighborhood flooding

Large amount of houses not connected to a storm/wastewater recollection system

Wastewaters discharged directly to CMP

Bacteriological and chemical pollution

PUBLIC HEALTH HAZARDS

BACTERIOLOGICAL SAMPLING

RESEARCH OBJECTIVE

To determine the relationship between gastrointestinal symptomatology (GID) with floods events and wastewater exposure among residents (communities) living nearby CMP water channel.

METHODOLOGY

Design:

- Cross sectional
  - sampling type was a random cluster sampling
  - Approved by PSMHS IRB (Protocol # 111220-MR)

Population:

- 19, 876 residents (6,031 houses)
  - CMP communities: Barrio Obrero Marina, Buena Vista -Santurce, Barrio Obrero, Parada 27, Las Monjas, Buena Vista -Hato Rey e Israel-Bitumul
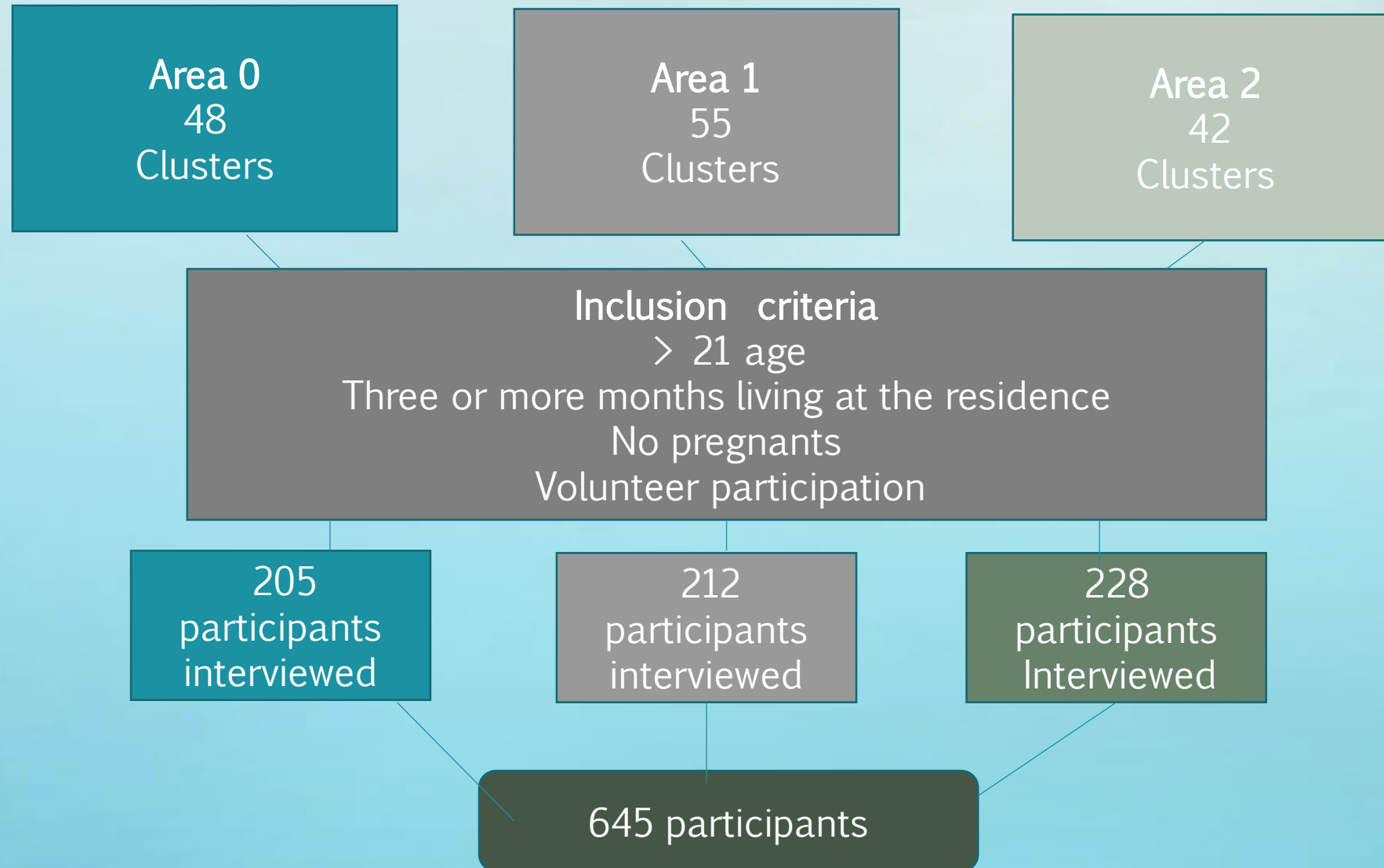
Sample: 645 participants

Wastewater exposure: was assessed by two routes (data was obtained from Census 2000):

- floods events frequency
- connections to a sewer system

CMP areas categories
ranked from lower to higher exposure levels

Area 0
48
Clusters

Area 1
55
Clusters

Area 2
42
Clusters

Inclusion   criteria
> 21 age
Three or more months living at the residence
No pregnants
Volunteer participation

205
participants
interviewed

212
participants
interviewed

228
participants
Interviewed

645 participants

CMP areas categories
ranked from lower to higher exposure levels

- ## Area 0
  - Communities with a <u>lower</u> percentage of homes subject to flooding and a <u>higher</u> percentage of homes connected to the sanitary sewer
  - The area was constituted by Barrio Obrero, Parada 27 and Buena Vista -Hato Rey
  - The exposure level is expected to be less than the other two areas

- ## Area 1
  - Communities with a <u>lower</u> percentage of homes with flooding issues and <u>lower</u> percentage of households connected to the sanitary sewer
  - This area includes Barrio Obrero Marina and Las Monjas
  - Intermediate exposure levels are expected

- ## Area 2
  - Communities with a <u>higher</u> percentage of homes with flooding issues and <u>lower</u> percentage of homes connected to the sanitary sewer
  - This area includes Israel - Bitumul and Buena Vista - Santurce
  - The exposure levels are expected to be higher than the other two areas

RESEARCH VARIABLES

GID Symptomatology during the last 24 hours	• **Three diarrhea episodes** • **1-2 vomit episodes**
GID Symptomatology at least once during the last three months	• **Nauseous with stomach ache** • **Nauseous or stomach ache interfering daily activities**
Floods (street and homes)	• flooded with or without a raining event • flooded during the past three months
Wastewaters	• Back flow (toilet, bathtub and sinks) • Wastewater disposal (connected or non-connected)
Drinking water	• Drinking water consumption • Water quality perception • Water uses related practices (washing, cooking)
Socio- demographics	• Age, gender, income

<u>Data analysis</u>: Descriptive statistics, POR, Interval of confidence (95%)

RESULTS

CMP Residents GID Prevalence

| Prevalence of GID symptomatology (last 24 hours)	
Gastrointestinal symptomatology	n (%)
vomits	13 (2.1)
Nauseous with stomach ache at the same time	36 (5.6)
Nauseous or stomach ache impeding to perform a daily activity	109 (17.2)
3 diarrhea episodes in 24 hours	38 (5.9)

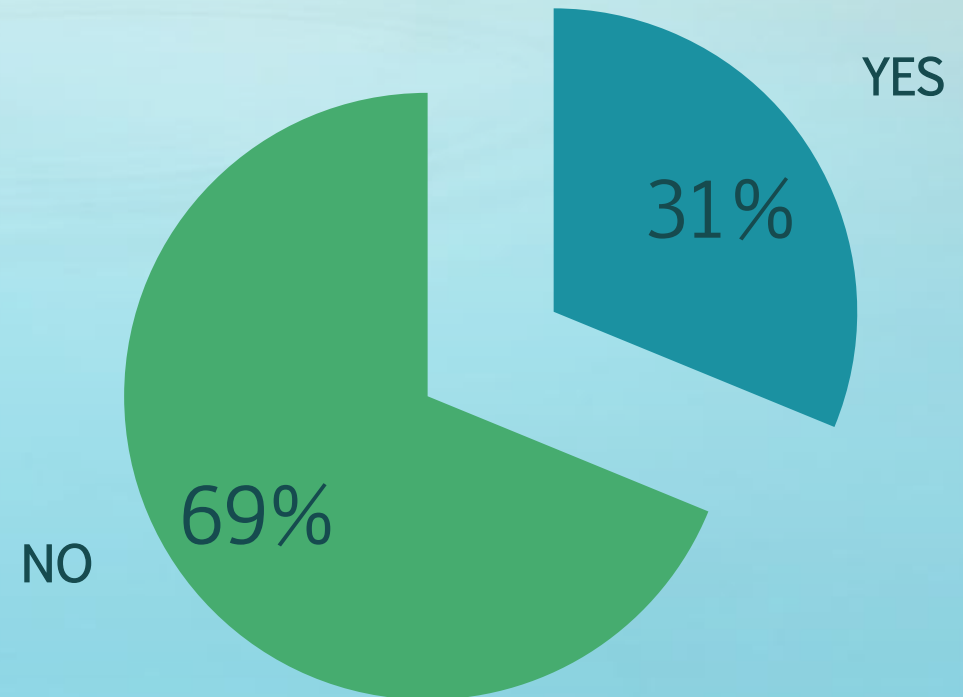| Prevalence of GID symptomatology (last 3 months)	
Gastrointestinal symptomatology	n (%)
vomits	100 (15.7)
Nauseous with stomach ache at the same time	129 (20.3)
Nauseous or stomach ache impeding to perform a daily activity	123 (19.2)
3 diarrhea episodes in 24 hours	78 (12.2)

GID definition according to EPA
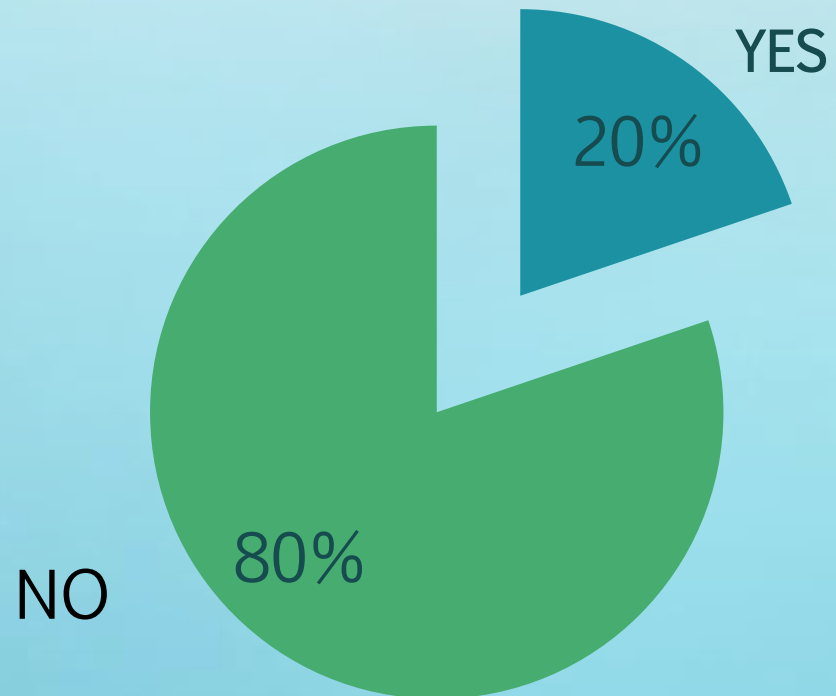
Prevalence of GID & Socio- demographics

Caño Martín Peña

Caño Martín Peña Prevalence of GID Linked to Socio- demographics
(last 24 hours)

VARIABLE	CATEGORY	GID (%)	OR	95% IC	P VALUE
GID LAST 24 HOURS					
GENDER	MALE	14.7	1.0		
	FEMALE	22.7	1.70	1.09-2.65	0.018
AGE	21 - 49 YEARS	13.0	1.0		
	50 - 64 YEARS	27.5	2.53	1.53-4.19	0.001
	≥ 65 YEARS	19.8	1.65	0.96-2.82	
TIME (HOURS) AT RESIDENCE (WEEKEND)	< 20 HOURS	14.8	1.0		
	> 20 HOURS	22.3	1.65	1.06-2.56	0.025
MONTHLY INCOME	LESS THAN $ 1000	25.7	1.82	1.32-2.91	0.056
	MORE THAN $ 1000	33.3	1.0		

Caño Martín Peña Prevalence of GID Linked to Socio- demographics
(last 3 months)

	VARIABLE	CATEGORY	GID (%)	OR	95% IC	P VALUE
GID LAST 3 MONTHS	GENDER	MALE	23.9	1.0		
		FEMALE	35.3	1.74	1.20-2.51	0.003
	AGE	21 - 49 YEARS	29.6	1.0		
		50 - 64 YEARS	37.1	1.61	1.07-2.41	0.059
		≥ 65 YEARS	29.4	1.13	0.74-1.73	0.57
	PAID JOB	0	35.8	1.96	1.32-2.92	0.001
		≥ 1	22.2	1.0		
	HOURS WORKED (WEEK)	≤ 20	18.0	1.0		
		21-39	31.9	2.37	1.05-5.36	0.03
		> 40	16.5	1.11	0.45-2.73	0.82

Prevalence of GID & Floods

Caño Martín Peña

Caño Martín Peña (GID) Prevalence   Linked to Flooding Events (last 24 hours)

	VARIABLE	YES /NO	GID (%)	OR	95% IC	P VALUE
GID **LAST 24 HOURS**	FLOODED DURING 2011 (HOMES)	YES	22.9	⭐1.53	1.01-2.31	0.043
		NO	16.2			
	FLOODED DURING PAST 3 MONTHS (HOMES)	YES	26.5	⭐1.81	1.20-2.72	0.004
		NO	16.6			
	FLOODED EVEN WITHOUT RAINING EVENTS (HOMES)	YES	32.0	⭐2.19	1.36-3.54	0.001
		NO	17.7			
	FLOODED AFTER RAINING EVENTS (HOMES)	YES	22.8	⭐1.60	1.05-2.40	0.028
		NO	15.7			
	FLOODED EVEN WITHOUT RAINING EVENTS (STREET)	YES	31.6	⭐2.33	1.51-3.60	<0.001
		NO	16.6			

Caño Martín Peña （GID） Prevalence Linked to Flooding Events (last 3 months)

	VARIABLE	YES/NO	GID(%)	OR	95% IC	P VALUE
GID (LAST 3 MONTHS)	FLOODED DURING 2011 (HOMES)	YES	37.2	1.84	1.30-2.60	0.001
		NO	24.4			
	FLOODED DURING PAST 3 MONTHS (HOMES)	YES	41.3	1.96	1.40-2.80	<0.001
		NO	26.5			
	FLOODED DURING PAST 3 MONTHS (STREET)	YES	38.6	2.00	1.42-2.83	<0.001
		NO	23.6			
	FLOODED EVEN WITHOUT RAINING EVENTS (HOMES)	YES	51.0	2.74	1.78-4.21	0.000
		NO	27.5			
	FLOODED AFTER RAINING EVENTS (HOMES)	YES	35.6	1.54	1.09-2.17	0.013
		NO	26.4			
	FLOODED EVEN WITHOUT RAINING EVENTS (STREET)	YESSI	47.9	2.50	1.7-3.7	<0.001
		NO	26.9			
	FLOODED AFTER RAINING EVENTS (STREET)	YES	34.7	1.67	1.14-2.45	0.008
		NO	24.1			

GID Health Profile

CAÑO MARTIN PEÑA

GID Health Profile at CMP Residents

DIAGNOSED GID	PREVALENCE	
	NO n (%)	YES n (%)
Gastritis	**482 (75.5)**	**156 (24.5)**
Gastroenteritis	584 (91.7)	53 (8.3)
Polips	591 (93.2)	43 (6.8)
Ulcers	599 (94.0)	38 (6.0)
Colitis	609 (97.1)	18 (2.9)
Diverticules	576 (91.3)	55 (8.7)
Crohm's disease	623 (98.4)	10 (1.6)
Irritable colom symdrome	603 (95.3)	30 (4.7)
Reflux o heartburn	**454 (71.6)**	**180 (28.4)**
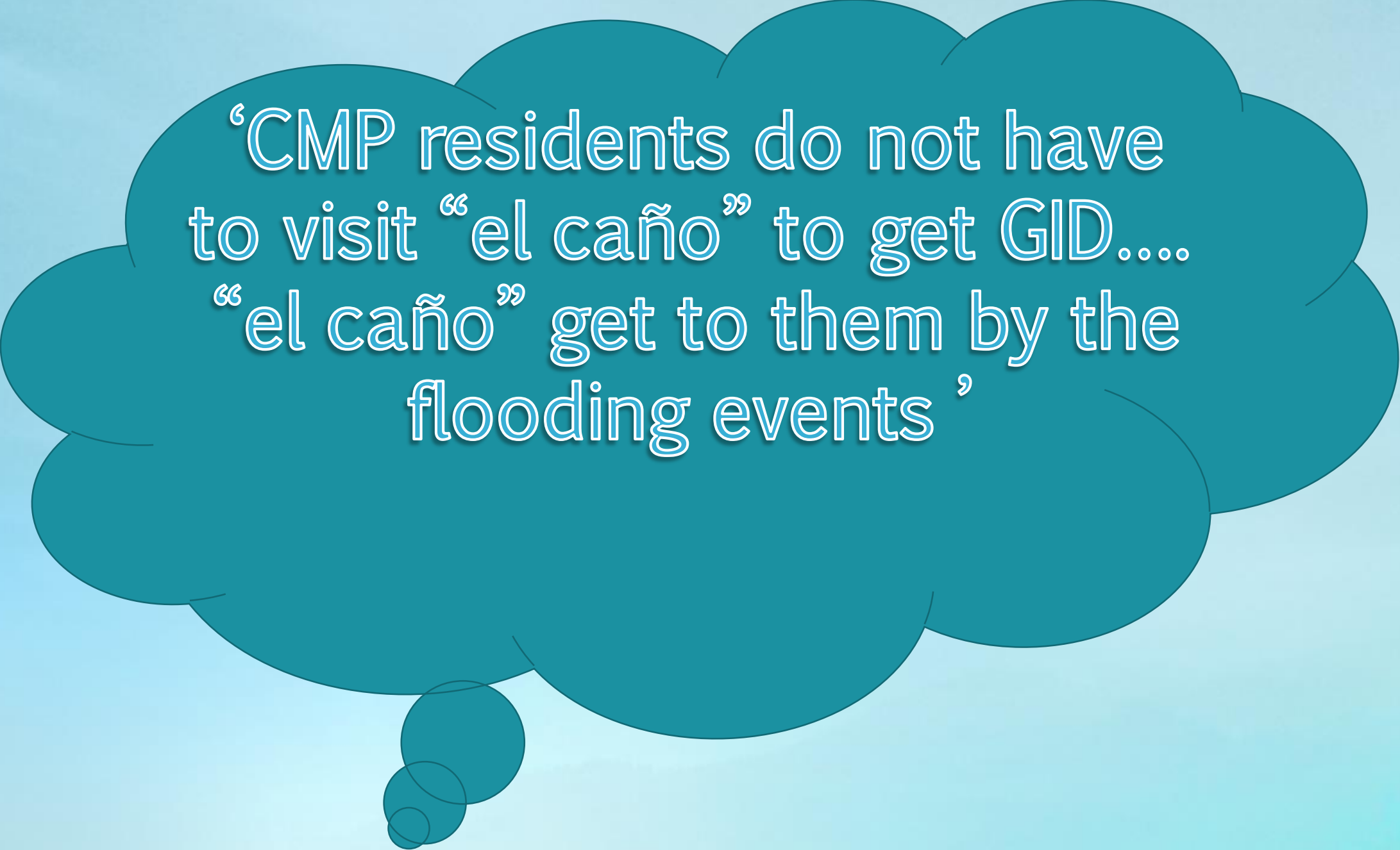
CMP RESIDENTS PRACTICES RELATED TO THEIR DRINKING WATER

VARIABLE			% GID (24 HOURS)	OR	95% IC	P VALUE
PRACTICES RELATED TO DRINKING WATER	DRINKING WATER SERVICE INTERRUPTIONS AT YOUR HOME?	YES	30.5	**2.05**	1.27-3.29	0.003*
		NO	17.6			
	DO YOU DRINK TEA WITH TAP WATER?	YES	25.9	**1.65**	1.08-2.52	0.020*
		NO	17.5			
	DO YOU DRINK YOUR HOME TAP WATER?	YES	22.0	1.28	0.85-1.91	0.228
		NO	18.0	1.0		

Drinking Water Perception

VARIABLE			GID 24 HOURS (%)	OR	95% IC	P VALUE
environmental profile linked to drinking water	Drinking water perception?	VERY GOOD/GOOD	25.3	2.16	1.41-3.30	<0.001
		REGULAR/BAD/VERY BAD	13.6			